

In the Claims:

Please amend the claims as follows:

Claims 1-10            (Cancelled)

11.    (New) A metal-to-metal antifuse formed over a planarized surface formed from a metal layer and the top surface of a lower insulating layer, comprising:

    a first cap layer covering the planarized surface;

    a first barrier metal layer forming an antifuse electrode disposed in a via in said cap layer over and in electrical contact with said metal layer, said via being narrower than said metal layer, said first barrier metal layer having an upper surface planarized with an upper surface of said cap layer;

    a layer of antifuse material disposed over said first barrier metal layer and having edges extending over said cap layer;

    a second barrier metal layer disposed over said antifuse material layer and having edges aligned with said edges of said antifuse material layer;

    a second cap layer disposed over said first cap layer and surrounding said antifuse material and said second barrier metal layer;

    an intermetal dielectric layer formed over said second cap layer; and

    a metal contact formed in a via in said intermetal dielectric layer and said second cap layer, said metal contact in electrical contact with said second barrier layer.

12.    (New) The metal-to-metal antifuse of Claim 11, wherein said antifuse material layer comprises a layer of amorphous silicon.

13.    (New) The metal-to-metal antifuse of Claim 11, wherein said first barrier layer comprises a layer of TaN.

14. (New) The metal-to-metal antifuse of Claim 11, wherein said second barrier layer comprises a layer of TiN.

15. (New) The metal-to-metal antifuse of Claim 11, wherein said first cap layer and said second cap layer are formed from SiN.

16. (New) The metal-to-metal antifuse of Claim 11, wherein said antifuse material layer comprises a layer of amorphous silicon.

17. (New) The metal-to-metal antifuse of Claim 11, wherein said first barrier layer comprises a layer of TaN.

18. (New) The metal-to-metal antifuse of Claim 11, wherein said second barrier layer comprises a layer of TiN.

19. (New) A method of forming a metal-to-metal antifuse over a planarized surface formed from a metal layer and the top surface of a lower insulating layer, comprising:

forming a first cap layer covering the planarized surface;

forming a via in said first cap layer over said metal layer;

forming a first barrier metal layer to form an antifuse electrode in said via, said via being narrower than said lower Cu metal layer, said first barrier metal layer in electrical contact with said metal layer;

planarizing said first barrier metal layer to have an upper surface planarized with an upper surface of said cap layer;

forming a layer of antifuse material over said first barrier metal layer and having edges extending over said cap layer;

forming a second barrier metal layer over said antifuse material layer and having edges aligned with said edges of said antifuse material layer;

forming a second cap layer over said first cap layer and surrounding said antifuse material and said second barrier metal layer;

forming an inter-metal dielectric layer over said second cap layer; and

forming a metal contact in a via in said inter-metal dielectric layer and said second cap layer, said metal contact in electrical contact with said second barrier layer.

20. (New) The method of Claim 19, wherein said antifuse material layer comprises a layer of amorphous silicon.

21. (New) The method of Claim 19, wherein said first barrier layer comprises a layer of TaN.

22. (New) The method of Claim 19, wherein said second barrier layer comprises a layer of TiN.

23. (New) The method of Claim 19, wherein said first cap layer and said second cap layer are formed from SiN.

24. (New) The method of Claim 19, wherein said antifuse material layer comprises a layer of amorphous silicon.

25. (New) The method of Claim 19, wherein said first barrier layer comprises a layer of TaN.

26. (New) The method of Claim 19, wherein said second barrier layer comprises a layer of TiN.